MINDFUL EATING: IS THERE A RELATIONSHIP AMONG GENDER, AGE, PHYSICAL ACTIVITY, GRADE LEVEL, FOCUS OF ACADEMIC MAJOR AND EATING MINDFULNESS AMONG COLLEGE STUDENTS

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Mindful Eating: Is There a Relationship Between Gender, Age, Physical Activity, Grade Level.

Focus of Academic Major, and Eating Mindfulness Among College Students

By

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ABSTRACT

Mindful eating is the concept of being physically and emotionally aware of what and why you are eating. Currently the research is limited, especially in a large college aged population. Therefore, the purpose of this study was to determine if age, gender, physical activity, year in school and focus of academic major made a difference in mindful eating practices in college students. In this cross-sectional study, 427 students completed a 28-item validated Mindful Eating Questionnaire. The results show that only gender played a role in the total mindful eating score. Combined effects of the factors did affect total score as well as subscale scores. These findings suggest that a combination of factors affect mindful eating more than one factor alone. More research is needed in large college aged populations in order to better determine mindful eating practices of individuals in this age group.

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CHAPTER 1. INTRODUCTION

With the ever growing obesity epidemic, it is increasingly important to examine why food choices are made and how these choices can be altered in order to return to a healthier state. Current data shows that 68.8% of American adult males (age 20 and over) are overweight or obese, and 63.7% of females are overweight or obese (Flegal, Carroll, Kit, & Ogden, 2010). Obesity among children and adolescents is also an issue. The most recent data shows that 31.8% of American children and adolescents are overweight or obese, with 16.9% being obese (Ogden, Carroll, Kit, & Flegal, 2012). The American College Health Association (2012) found that 38.6% of male American college undergraduate students are overweight or obese, and 31.5% of female American college undergraduate students are overweight or obese.

Weight gain is caused by an imbalance of energy, caloric intake, and expenditure. When more calories are taken in than are used,calories are stored as fat leading to weight gain (Aronne, Nelinson, & Lillo, 2009). There are many factors that can lead to weight gain: genetics, environment, physical activity level, and culture, as well as certain medical conditions and treatments (Aronne et al., 2009). Those who are obese are at an elevated risk of developing chronic diseases and health conditions such as heart disease, stroke, type II diabetes, hypertension, certain cancers, dyslipidemia, and osteoarthritis (Burton, Foster, Hirsch, & VanItallie, 1985). Due to the number of overweight and obese individuals and the associated risk factors, it is imperative that effective treatments are developed. One possible behavioral treatment is mindful eating.

Mindful eating is a term used to describe a nonjudgmental awareness of physical and emotional sensations while eating or in a food-related environment (Framson et al., 2009). The

quantities that are eaten, or larger portion sizes, have been identified as one of the main causes of excessive calorie consumption (Hetherington, 2007; Ueland, Cardello, Merrill, & Lesher, 2008; Wansink & Dyson, 2010). Essentially, most people overeat simply because the food is there. Examining the process of making food decisions is more difficult to measure since many times individuals are unaware of the volumes they are eating (Hetherington, 2007; Vartanian, Wansink, & Herman, 2008). The average person makes over 200 food choices every day (Wansink & Sobal, 2007). By determining and understanding why individuals make the everyday food choices that they do, advances in obesity treatment and prevention can be made.

Dieting in the United States has become a high-revenue market and yet the prevalence of obesity keeps climbing (Cole & Horacek, 2010). Although there are hundreds of diets designed to aid in weight loss, they are not always successful. By determining why food choices are made and teaching individuals to make the best choices, healthy eating can become a way of life. Currently much of the mindful eating research being conducted involves placing participants in various eating situations and measuring the volume of food consumed. This is followed by questions about the amounts they ate such as: was the portion size large enough, do they know the amount of food they ate, and what influenced the quantity eaten (Ueland et al., 2008; Wansink, Painter, & North, 2005; Wansink & Park, 2001). Also, a popular area of mindful eating research asks participants if they know appropriate portion sizes, and if they can distinguish appropriate portion sizes from portions served (Hetherington, 2007; Leone, Pliner, & Herman, 2007; Ueland et al., 2008; Vartanian et al., 2008). Most individuals do not realize how much the environment and the amount eaten by companions can influence the amount they consumed (Hetherington, 2007; Vartanian et al., 2008; Wansink & Dyson, 2010).

Most of the research in mindful eating has focused on an adult population. This leaves opportunities to assess the habits of college age individuals. College students are in a stage of their lives that will shape their future diet habits and lifestyles (Anding, Suminski, & Boss, 2001; Hoffman, Policastro, Quick, & Lee, 2006; Levitsky, Garay, Nausbaum, Neighbors, & DellaValle, 2006). This makes college students a desirable population to study. Findings from previous studies have indicated that by becoming more aware of what causes individuals to overeat and controlling those cues, weight gain may be able to be avoided.

With the findings from the available research, the need to examine the psychology behind eating is increasingly important in order to effectively fight the obesity epidemic. The available research is fairly limited to studies involving eating followed by related questions, which may lead the participants to justify why they overate instead of focusing on what cues actually caused them to eat the volume they did. By focusing on asking questions about eating habits without food present, we may be able to gain insight into the thought process, if any, behind why we eat the way we do. Therefore, the purpose of this study is to assess mindful eating characteristics of college students at the undergraduate level with regard to age, gender, physical activity, year in school, and academic major.

Research Questions

- Does age or gender influence mindful eating?
- Does activity level influence mindful eating?
- Does a health science focused degree increase the practice of mindful eating?

Organization of Thesis

This thesis is organized into chapters and is written in article format. The first chapter includes the introduction, research questions, delimitations, limitations, and definitions. The following chapter is the literature review. Chapter three is written as a journal article. Chapter four is a brief conclusion and summary of the results.

Delimitations

Participants were college students enrolled in lower level nutrition and wellness classes at North Dakota State University. Participants completed a 28 item survey during the first month of classes. The survey consisted of the participants rating agreement level with statements asking about eating cues and how they respond to those cues. They also answered questions about demographics and physical activity levels.

Limitations

There were potential limitations to this study. This was a cross-sectional study and therefore causation cannot be determined. The second limitation is that all participants were enrolled in nutrition and wellness classes, and individuals in these classes may be more conscious about their eating habits. Moreover participants were self-reporting; therefore, responses may be skewed toward the perceived "correct" answers. However, it is anticipated participants were honest since it was an anonymous survey.

Definitions

A binge is defined as a period of uncontrolled or excessive indulgence and is most commonly used to describe consumption of food or alcohol (Ferriter & Ray, 2011). Binge eating

occurs when eating a larger amount of food than normal during a short period of time experiencing a loss of control and overeating (Ferriter & Ray, 2011).

Dietary disinhibition refers to overeating episodes usually caused by an event, frequently times of stress (Haynes, Lee, & Yeomans, 2003). The disinhibition effect occurs when restrained eaters overeat following an external or emotional cue (Ouwens, van Strien, & van der Staak, 2003).

Dietary restraint describes the cognitively mediated effort individuals make to restrict caloric intake in order to control body weight (Haynes et al., 2003).

Distracted eating is the term used for eating while engaged in non-food activities such as watching television, listening to music, and playing computer or video games (Oldham-Cooper, Hardman, Nicoll, Rogers, & Brunstrom, 2011). This can lead to an increase in the amount of food consumed, which may be due to more attention being given to the activity and less to visceral sensations generated during the meal. Thus overeating may occur (Oldham-Cooper et al., 2011).

Eating awareness has been defined as discerning the effects of food on the senses and how it affects one's internal states (Moor et al., 2012). This means paying attention to what you are eating, the appearance, colors, smell, taste, texture, and so on. Framson et al. (2009) defined eating awareness as observing, noticing, or attending to the sensations, perceptions, thoughts, and feelings; and acting with awareness. This definition was further specified as organoleptic awareness, which means being aware of and appreciating the effects of food on the senses; affective sensitivity; being aware of how food affects internal states; and distraction (Framson et al., 2009).

Eating competence is the biopsychosocial act of eating (Satter, 2007). This includes eating satisfying amounts, using internal cues of hunger and satiety to determine how much to eat, willingness to try new foods, eating a variety of foods, and the ability to plan and prepare meals (Clifford et al., 2010).

An eating environment is the atmosphere in which an individual is eating but does not include the actual food. This includes but is not limited to the effort it takes to get food, time of day, eating companions, and various other distractions present while eating (Wansink & Sobal, 2007), such as eating at home, at a restaurant, eating with friends or alone, eating while watching television, or with some other form of distraction.

Emotional eating is the tendency for individuals to eat in response to negative emotions (Konttinen, Mannisto, Sarlio-Lahteenkorva, Silventoinen, & Haukkala, 2010). The idea of emotional eating derives from the psychosomatic theory and is a consequence of not being able to distinguish hunger from other adverse internal states, or the use of food to ease emotional distress (Konttinen et al., 2010). Emotional cues are a response to an emotional arousal and stress leading to an excessive intake of food (van Strien & Ouwens, 2003).

External cues are the exposure to palatable food which induces cravings and a tendency to indulge often in these foods leading to overeating, even in the absence of physiological hunger (Nijs, Franken, & Muris, 2008).

A food environment is made up of the factors that are directly related to how the food is provided and presented (Wansink & Sobal, 2007). This includes its structure, packaging, the amount of food, and how it is served (Wansink & Sobal, 2007).

Hunger, or food cues, is the physiological preparedness to consume food, the desire to eat, and cravings for certain foods (Tetley, Brunstrom, & Griffiths, 2010). Food cues can be internal, external, or emotional. Internal hunger cues are the signal given by the body indicating a physiological need for food.

Intuitive eating is similar to mindful eating but is more about eating what the individual desires to eat not just eating "good for you foods". Intuitive eating implies tuning into one's body and listening to its hunger cues; however, it does not include meditation as mindful eating does (Mathieu, 2009). Intuitive eating is not what one eats but the eating rate and patterns of the individual based on the individual's psychological hunger and satiety cues (Tylka, 2006). Intuitive eating identifies four reasons for eating: physiological hunger and fullness signals, environmental or external cues (television marketing, food aromas, food in open sight), societal cues (social gathering, celebrations), and emotional stimulus (stress, anxiety, loneliness, boredom) (Cole & Horacek, 2010). There are three main ideas associated with intuitive eating: permission to eat when hungry and to eat whatever food is desired, eat for physical reasons rather than emotional, and rely on internal hunger and satiety cues to determine when and how much to eat (Tribole & Resch, 1995, Tylka, 2006). These ideas are all interrelated and are all necessary when practicing intuitive eating (Tribole & Resch, 1995). There are ten principles associated with intuitive eating (1) reject the diet mentality, (2) honor your hunger, (3) make peace with food, (4) challenge the food police, (5) feel your fullness, (6) discover the satisfaction factor, (7) cope with emotions without using food, (8) respect your body, (9) exercise, feel the difference, and (10) honor your health with gentle nutrition (Tribole & Resch, 1995). The goal of intuitive eating is to provide an alternative to dieting, by incorporating healthy behaviors to

improve physical and emotional health without the focus of quick weight loss (Tribole & Resch, 1995).

Mindful is defined as an astute, nonjudgmental awareness of the present moment (Framson et al., 2009). It is a learned skill that has been linked to several positive health outcomes, including increased immune function, and decreased anxiety and chronic pain (Framson et al., 2009). Mindfulness is also being used in a nutritional context in order to help individuals become more aware of what they are eating and learning to listen to their bodies.

Mindful eating is defined as the act of listening to ones body's cues for hunger, taste, and fullness (Mathieu, 2009). Framson et al., (2009) define mindful eating as a nonjudgmental awareness of physical and emotional sensations while eating or in a food-related environment. This is simply being able to recognize and acknowledge when the body tells the individual it is full or hungry and acting appropriately. This means eating when one is hungry, stopping when one is full, or not eating something if it does not taste good. Mindful eating also takes into account eating environment, eating slowly, being aware of why one is eating, and meditation (Mathieu, 2009).

Nibbling, picking, and grazing are all terms used to describe eating in an unplanned and repetitious manner between meals and snacks with an accompanying sense of loss of control, often times the amount of food consumed is unknown. This may contribute to weight gain and disordered eating behaviors (Reas, Wisting, Kapstad, & Lask, 2012).

Trait mindfulness, or dispositional mindfulness, refers to the level of mindfulness a person has during everyday activities, whereas, state mindfulness refers to the level of mindfulness an individual obtains during, or the result of, engaging in mindfulness meditation

exercises (Cahn & Polich, 2006). Dispositional mindfulness may be the result of mindful meditation training, it is different enough from state mindfulness that they can be examined separately (Murphy, Mermelstein, & Gidycz, 2012).

CHAPTER 2. REVIEW OF LITERATURE

Obesity has reached startling levels. With 38.6% American male undergraduate students and 31.5% of American female undergraduate students overweight or obese something has to be done. One purposed solution is the practice of mindful eating. The first step to this solution is to evaluate current mindful eating levels of undergraduate students. The purpose of this study is to assess mindful eating characteristics of undergraduate students in regards to age, gender, physical activity, year in school, and academic major.

College Student Eating Habits

College students are at a point in their lives where their future diet and lifestyle habits are being formed (Anding, Suminski, & Boss, 2001; Hoffman, Policastro, Quick, & Lee, 2006; Levitsky, Garay, Nausbaum, Neighbors, & DellaValle, 2006). Typically college students have less healthy diet habits than the average adult; however, they do not realize this (Driskell et al., 2005). These eating habits are mainly due to financial constraints, meal skipping, higher rates of snacking, lack of variety in food choices, and higher amounts of fast food consumption (Driskell et al., 2005). A recent study found that college students ranked convenience, taste, and cost as the three most important factors when making food selections (Driskell et al., 2005). Driskell et al. (2005) compared eating habits of lower-level and upper-level undergraduate students, finding very few differences between the two. Only two significant differences related to eating were found: upper-level students were more likely to consume an afternoon snack, and lower-level students ate more frequently in the university cafeteria (Driskell et al., 2005). Other than the two listed differences, the eating habits appeared to change very little among lower-level and upper-level undergraduate students.

Anding, et al. (2001) examined the dietary intake of college women to determine if they were following the Dietary Guidelines for Americans. These researchers found that most college females were not following the Dietary Guidelines for Americans (Anding et al., 2001). Of the students who were surveyed, none consumed the minimum number of servings from all components of the Food Guide Pyramid (Anding et al., 2001). A majority of students typically only followed one of the seven Dietary Guidelines for Americans, and were also found to consume more fat, sugar, and salt than recommended (Anding, et al., 2001). The findings of these two studies show that college students do not follow a healthy meal plan; moreover, long term adherence to this type of diet can lead to weight gain.

One study identified factors that college students perceived to contribute to healthy eating patterns, physical activity levels, and weight change (LaCaille, Dauner, Krambeer, & Pederson, 2011). The study consisted of 49 college students who were divided into six focus groups. Each of the focus groups was asked a series of questions about past and present eating and physical activity habits. The research team found that the male students perceived gaining weight differently depending if it were muscle ("good") and fat ("bad"), and the female students were more concerned with getting fat than whether weight gain was muscle or fat. Both male and female students identified motivation and self-control as facilitators of healthy eating. Other healthy eating behaviors, in addition to motivation and self-control, were identified to be alcohol use, convenience, cost, lack of time, and lack of healthy options. Overall, the researchers found that healthy eating and physical activity behaviors in college students were determined by a complex relationship between motivation, self-regulation skills, social interaction, and physical environments.

A recent study found that mindfulness may play a role in the health of first year college students (Grinnell, Greene, Melanson, Blissmer, &Lofgren, 2011). Mindfulness was assessed using the Mindful Attention Awareness Scale, which consists of fifteen items that are ranked on a six-point Likert scale ranging from "almost always" to "almost never" for all items (Grinnell et al., 2011). The researchers found that more mindful and less mindful participants were similar in anthropometric and clinical measures, except that participants who were less mindful had a higher waist circumference than those who were more mindful (Grinnell et al., 2011). However, since significant differences were seen in behavioral measures, it may be expected that if these behavioral differences were sustained long term, differences would be seen in anthropometric and clinical measures (Grinnell et al., 2011). Participants with increased mindfulness showed a lower susceptibility to emotional eating, eating in response to external cues, eating restraint, and less personal barriers to physical activity (Grinnell et al., 2011).

Another study examined dispositional mindfulness and its benefits in relation to health behaviors (Murphy et al., 2012). The researchers surveyed 441 undergraduate female students. The surveys were completed at the beginning and the end of a 10-week academic period. The surveys used were the Mindfulness Attention Awareness Scale, Leisure-Time Exercise Questionnaire, and Eating Attitudes Test, a sleep questionnaire created by the research team, and the Cohen and Hoberman Inventory of Physical Symptoms. The researchers found that higher levels of dispositional mindfulness significantly predicted overall better physical health. Positive relationships were found between healthy eating and physical health, between healthy eating and dispositional mindfulness, as well as dispositional mindfulness and physical health. These findings indicate that it may be beneficial to incorporate mindfulness training into student health programs on college campuses.

Moor, Scott, and McIntosh (2012), examined the relationship between mindful eating and body mass index (BMI) and physical activity in university students. The study consisted of 90 participants who completed the Mindful Eating Questionnaire; the same survey was used in the present study. A negative relationship between BMI and minutes of physical activity per week and between BMI and overall mindful eating score was found. When the survey was divided into the five subscales (disinhibition, awareness, external cues, emotional response, and distraction) it was found that as BMI increased the scores for the disinhibition and emotional subscales decreased. No significance was seen when comparing BMI and the awareness, distraction, and external cue subscales. The researchers also found that participants who were more physically active were more apt to be less aware of their food and to eat more in response to emotions. These findings imply that the practice of mindful eating may be lead to more effective interventions for addressing overweight and obesity risk in the college student population.

Eating Assessments

Several studies have been conducted to measure food consumption while in different situations and to determine awareness of the volume consumed. External cues such as packaging and container size have been shown to strongly and unknowingly increase the amount of food consumed (Wansink & Park, 2000). Wansink and Park (2000) examined the effect of popcorn container size on consumption while at a movie theater. They found that while at the movies the size of the popcorn container had a larger effect on amount consumed than the taste of the popcorn. Participants were either given a large or small container of popcorn to enjoy during the movie. After the movie the amount eaten was measured and participants were asked to complete

a questionnaire (Wansink & Park, 2000). Participants given a larger container of popcorn ate 53% more popcorn than those given smaller containers (Wansink & Park, 2000). The results suggest that the larger containers made it more difficult for consumers to monitor the amount they consumed (Wansink & Park, 2000). The researchers also found that along with container size, attention, gender, and the presence of others increased the amount of popcorn consumed. This study showed that external cues, container size, played a larger role in consumption than internal cues, taste, especially when eating is combined with something distracting such as watching a movie (Wansink & Park, 2000).

The next study consisted of bottomless bowls of soup: participants were either given a regular bowl of soup or a self-refilling soup bowl where consumption was monitored. This was followed by a questionnaire to determine whether visual cues related to portion size can influence intake volume without altering either estimated intake or satiation (Wansink, Painter, & North, 2005). The self-refilling soup bowl was placed on a table where a tube connected the bowl to a pot of soup. The pot was slightly elevated allowing for the soup to flow into the bowl slow enough as to be unperceivable, keeping the bowl full as the participant ate from it. Participants who ate out of the bottomless bowls ate 73% more than those who ate from the regular bowls (Wansink, Painter, & North, 2005). Even though the participants who received the bottomless bowl ate significantly more, they did not believe that they consumed more soup than their counterparts who ate from a regular bowl. This supports the idea that external cues such as portion size have more effect on consumption than feelings of fullness; that the amount of food on a plate or bowl increases intake because it influences consumption norms and expectations. It appears that people use their eyes to count calories rather than their stomach showing the

importance that having salient and accurate visual cues plays in the prevention of unintentional overeating.

Another study consisted of two serving tables: the first had two large bowls of various snacks and the second had four smaller bowls of the same snacks as the large bowls (Wansink & Cheney, 2005). The purpose of the study was to investigate how the size of serving bowls influenced how much food the participants served themselves and then consumed in a natural environment. The participants, who were attending a Super Bowl party, were divided into two groups. Each participant served their own snacks from the assigned table. Plates were weighed to determine the amount each participant took, after one hour plates were reweighed to determine plate waste. The results showed that those who served themselves from the larger bowls took 53% more food and consumed 56% more food than those in the smaller bowl group (Wansink & Cheney, 2005). The size of a serving bowl, or of a portion, may provide consumption cues that suggest an appropriate amount to eat. This in turn would mean that larger bowls, like larger packages or portions, may suggest that a proportionately larger amount is appropriate to consume. This may mean that using smaller serving bowls may lead to smaller portions being consumed. The results show that even small environmental factors can have a large influence on food consumption.

Another study examined amount of food consumed when different portion sizes were provided. Rolls et al. (2004) studied how the portion size of a packaged snack affects energy intake of the snack and the subsequent meal. The participants were seen on five different days, on these days they were assigned to an individual cubical where they were given an afternoon snack of one of five portion sizes and then provided dinner (Rolls et al., 2004). They found that

snack intake increased significantly as the package size increased for both males and females (Rolls et al., 2004). The researchers also found that the combined energy intake from snack and dinner also increased as the package size of the snack increased (Rolls et al., 2004). These findings exhibit that short-term energy intake increases with increasing package size of a snack, and that the availability of large packages of energy-dense snacks may be an environmental influence associated with excess energy intake (Rolls et al., 2004).

Another study examined whether increasing the portion size of an entrée affected the energy intake of a meal consumed at a restaurant (Diliberti et al., 2004). The study consisted of participants who were eating in a restaurant where a pasta dish was being served. Two different portion sizes were served, a standard portion and a large portion. Intake was measured by weighing each dish before and after being served to the participants and intake of all other foods was determined by estimating the percent consumed. A survey was also completed by all participants where they rated characteristics of the meal such as appropriateness of the portion size and the amount they ate compared to usual meal intake. These researchers found that portion size significantly affected intake: those who had the larger portion increased energy intake of the entrée by 43%, and by 25% of the entire meal. No difference was seen in the ratings of the appropriateness of the portion size or of the amount eaten in relation to normal meal consumption between the two portion size groups. These results show that in a restaurant setting increasing the size of an entrée results in increased energy intake, which may contribute to increased obesity rates.

An additional study examined how portion size information influences satiety and intake, and how consumers interpret the term portion size (Ueland et al., 2009). The study consisted of

38 subjects who were served a lunch consisting of portioned pasta followed by additional servings dished by the participants. The participants were told their first serving was one of three portions. Participants were asked to rate their hunger/fullness before and after being served the meal, after eating they were asked if the portion was enough food. Results showed that portion size information did not influence satiety rating or total intake. The participants associated portion size with daily nutrient requirements rather than the quantity of food for satiety. This suggests that portion size may not be a good tool to manipulate food intake habits, assuming that the majority of individuals are not aware of correct portion sizes.

Distracted Eating

A recent study investigated whether more food is consumed while eating when distracted, and if that increases later food intake (Oldham-Cooper et al., 2011). The study consisted of 44 participants who were divided into two groups, the first group ate while playing a computer game and the second group ate without distraction. A fixed lunch was served and participants had a set amount of time to consume the meal, followed by questionnaire where they rated their fullness and hunger. They then got a break, and then received a snack, with all food being measured before and after it was presented to participants. The researchers found that those who ate while playing the computer game ate significantly more and were less full after the meal than those who ate undistracted. These findings provide more evidence that if eating while distracted, consumption is increased.

Another study investigated the effects of distraction and focused attention on actual and perceived food intake (Long, Meyer, Leung, & Wallis, 2011). The study consisted of 27 females, who attended three sessions in which a meal was provided and offered for consumption

in a different condition each time. During the control condition, the participant ate the meal alone with no distractions. In the focused attention condition, the meal was consumed while listening to instructions on how to pay attention to the sensory characteristics of the food. The final condition was the distraction condition. In this condition the participants ate alone while listening to a thirty minute extract from a book. After each meal the plate was removed, and the participant rated their level of fullness and how much food they thought they had eaten. Intake was measured by weighing the food before and after it was served. The research team found that intake was significantly higher in the distracted conditions than the control and the focused conditions. These results suggest that distraction could increase food intake in all non-clinical consumers regardless of individual differences in eating behaviors.

An additional study looked at the effect of television watching during lunch and its effect on afternoon snack intake (Higgs & Woodward, 2009). The study consisted of 16 female undergraduate students who were served a fixed lunch while either watching television or not. In the afternoon the participants were given a measured snack of cookies. After lunch the participants rated their fullness, which was the same for both groups. The participants who ate lunch while watching television ate significantly more cookies during the snack time. The researchers also found that watching television while eating lunch reduced the vividness rating of the memory of lunch. These findings show that watching television while eating lunch has an effect on food consumption that lasts past the time of the initial television watching.

Mindful Eating Interventions

A recent study was conducted to determine the effectiveness of a mindful restaurant eating intervention on weight management in women (Timmerman & Brown, 2012). This study

consisted of 35 women who participated in weekly educational sessions. They were instructed in was to reduce calories and fat intake when eating out, behavior change strategies, and mindful eating meditations. At the end of the study those who were in the intervention group had lost significantly more weight, had less daily calorie and fat intake, had increased diet-related-self-efficacy, and fewer barriers to weight management while eating in restaurants. This study showed that a mindful eating intervention was effective in promoting weight loss and weight management in perimenopausal women.

The next study piloted Mindful Eating and Living (MEAL), which is a brief curriculum for providing mindfulness training to obese individuals (Dalen et al., 2010). The study consisted of 10 individuals who participated in group classes for six weeks. The curriculum included training in mindfulness meditation, mindful eating, and group discussion with an emphasis on awareness of body sensations, emotions, and triggers to overeat. The main evaluation markers were weight change, body mass index, eating behavior, psychological distress, and blood work to measure C-reactive protein. The researchers found that there were significant increases in measures of mindfulness and cognitive restraint around eating, and statistically significant decreases in weight, eating disinhibition, binge eating, depression, perceived stress, physical symptoms, negative effect, and C-reactive protein. These findings suggest that eating focused mindfulness-based interventions can result in significant changes in weight, eating behavior, psychological distress, and decreased inflammatory response in obese individuals.

Alberts & Raes (2012) explored the efficacy of a mindfulness-based intervention for problematic eating behavior. The study consisted of 26 women with disordered eating behavior; the participants were randomly assigned to the treatment or the control group. The treatment

consisted of eight weeks of mindfulness-based cognitive training, consisting of five core components: (1) mindful eating, (2) awareness of physical sensations, (3) awareness of thoughts and feelings related to eating, (4) acceptance and non-judgment of sensations, thoughts feelings and body, and (5) awareness and step-by-step change of daily patterns and habits of eating and physical activity. When compared to the control group, the treatment group showed significantly greater decreases in food cravings, dichotomous thinking, body image concern, emotional eating, and external eating cues. These results imply that mindfulness practices can be an effective strategy to reduce issues associated with problematic eating behavior.

However not all studies have such positive results. A different study examined the evaluated participation in a mindfulness-based stress reduction program and its influence on eating behaviors and nutritional intake through changes in emotional eating, uncontrolled eating, and the type and quantity of food consumed (Kearney et al., 2012). This study consisted of 48 participants who were assessed before, after, and four months after participating in five mindfulness-based stress reduction classes. The research team found that no significant changes in emotional and uncontrolled eating. There were also no significant differences seen in energy, fat, sugar, fruit, or vegetable intake. Some changes were seen in the improvement of mindfulness skills and a reduction in depressive symptoms over time. These results show that participation in a mindfulness-based intervention does not always lead to beneficial eating behavior changes. Those who did not complete the program consumed nearly 1000 more calories per day than those who completed the program. These findings are similar to other studies that used mindfulness training without a focus on eating. The main reason that these results were seen is that this program did not focus on eating meditation; therefore, it was difficult to measure changes in eating behaviors.

Intuitive Eating

Cole & Horacek (2010) evaluated the effectiveness of an intuitive-eating program which was tailored to assist military spouses in rejecting the dieting mentality. The study consisted of 61 individuals whose diet mentality and health indicators were evaluated. The intervention was based on the 10 intuitive eating principles and was developed by the precede/proceed health promotion planning model. At the end of the intervention, a significant transition was seen with participants moving away from a diet mentality and towards intuitive eating lifestyle behaviors. The researchers concluded that intuitive eating was an approach to long-term healthy lifestyle behavior changes and an extended support system would be a great benefit in improving effectiveness.

Another study examined intuitive eating and physical activity in men (Gast, Madanat, Campbell, & Nielson, 2012). The study consisted of 181 male college students who completed an intuitive eating survey. The research team found as age increased, intuitive eating status decreased and body mass index increased. The participants who had a higher intuitive eating score also tended to score high in the areas of anti-dieting and self-care. The researchers found that body mass index decreased by 0.098 for every unit of increase in intuitive eating score. These findings suggest that intuitive eating education could be used to treat overweight and obese individuals.

Mindful Eating Survey Validation

A mindful eating survey was developed in order to support rigorous scientific inquiry into the concept of mindful eating ((Framson et al., 2009). The researchers developed the pool of questions based on hypothesized domains of mindful eating. The cross-sectional survey

examined the associations of the mindful eating questionnaire scores with demographics and health-related characteristics. The questionnaire was distributed to seven convenience samples. The participants were mostly white females with an average age of 42, with a range of 18-81. A higher scorer indicated higher mindfulness. The survey was distributed to seven different convenience samples, a yoga studio, a university fitness facility, a weight loss program, a women's weight loss and fitness facility, a software development company, a nonprofit company, and to teachers and administrators at a preparatory school. The yoga studio and weight loss facilities were chosen in order to examine the association of mindful eating with yoga and weight loss.The mean of all factors was the summary score. Domains of the final questionnaire were: disinhibition, awareness, external cues, emotional response, and distraction. The findings showed that the mindful eating questionnaire score was inversely associated with body mass index. The researchers found that yoga was associated with a higher score; however, walking and moderate to intense physical activity were not. The negative association with body mass index and positive association with yoga provide evidence of construct validity, and hint that overall mindfulness may influence mindful eating.

CHAPTER 3. MINDFUL EATING: DO AGE, GENDER, PHYSICAL ACTIVITY LEVEL, YEAR IN SCHOOL, AND FOCUS OF ACADEMIC MAJOR MAKE A DIFFERENCE AMONG COLLEGE STUDENTS

Abstract

Mindful eating is the term used to describe being physically and emotionally aware of what and why you are eating. Current research on this topic is limited, especially in the college aged population. Therefore the purpose of this study was to determine if age, gender, physical activity, year in school and academic major focus made a difference in mindfuleating practices in Midwestern college students. In this cross-sectional study, 427 students completed a 28-item validated Mindful Eating Questionnaire. The results show that female students had higher mindful eating summary scores than males. There were no significant differences found between the summary score and age, gender, physical activity level, year in school, or academic major focus. However, a significant interaction occurred between mindful eating summary score and gender and physical activity. Interactions were also found between mindful eating summary score and age, and mindful eating summary score withyear in school and physical activity level. These findings suggest that a combination of factors effect mindful eating rather than one factor alone.

Introduction

Obesity has been, is, and will continue to be a large health problem in the United States and around the world until realistic and effective treatments are developed and accepted. According to the American College Health Association (2012), over 30% of American college undergraduate students are overweight or obese. Those who are obese are at an elevated risk for

developing several chronic health issues such as: heart disease, stroke, type II diabetes, hypertension, certain cancers, dyslipidemia, and osteoarthritis (Burton, Foster, Hirsch, & VanItallie, 1985).

Typically college students have less healthy diets than the average adult; however, this is often not realized by college students (Driskell, Kim, & Goebel, 2005, Racette, Deusinger, Strube, Highstein, &Deusinger, 2005). This makes college students a desirable population to study and teach healthy eating habits. Driskell et al., (2005) found that the three most important factors that college students consider when making food selections are convenience, taste and cost. These factors can, and many times do, limit the food options available to college students. Anding, Suminski, and Boss (2001) found that, in their participant group of college students, no one consumed the minimum number of serving from all components of the Food Guide Pyramid. Moreover, a majority of the students typically only followed one of the seven guidelines of the Dietary Guidelines for Americans (Anding et al., 2001).

One way to combat the obesity epidemic and instill healthy eating habits is by teaching individuals to be mindful, and more specifically, to use mindful eating techniques. Mindful is defined as an astute, nonjudgmental awareness of the present moment (Framson, Kristal, Schenk, Littman, Zeliat, & Benite, 2009). This is a learned skill and is often linked to several positive health outcomes, including, increased immune function and decreased anxiety and chronic pain (Framson et al., 2009). Mindfulness has been applied to eating in order to teach individuals to become more aware of their body's cues related to eating.

Mindful eating, the act of listening to the body's cues for hunger, taste, and fullness (Mathieu, 2009), is a nonjudgmental awareness of physical and emotional sensations while

eating or in a food-related environment (Framson et al., 2009). This simply means an individual is able to recognize and acknowledge when one is full or hungry and then following through with the appropriate action. Mindful eating includes not only the act of eating but, includes the eating environment, eating speed, being aware of the reason for eating, and meditating (Mathieu, 2009).

Several studies about mindful eating have been conducted, but few have focused on college students, and few have involved more than 100 participants. The studies that have involved college students have all had similar results; that mindfulness and mindful eating may have beneficial outcomes in helping college students establishing healthy eating habits for the future (Grinnell, Greene, Melanson, Blissmer, & Lofgren, 2011; Murphy, Mermelstein, & Gidycz, 2012; Moor, Scott, & McIntosh, 2012). Grinnell et al. (2011) found that although anthropometric and clinical measures were similar regardless of mindfulness scores, those with higher scores were less likely to eat in response to emotions or external cues, restrain their eating, and had fewer barriers to physical activity. This study suggested that if these differences were sustained long term, anthropometric and clinical differences would be seen (Grinnell et al., 2011). In support of those findings, Murphy et al. (2012) found that higher levels of trait mindfulness were positively correlated with healthy eating and better overall physical health. Moor et al. (2012) also examined mindful eating in college students regarding body mass index and physical activity. As body mass index decreased, mindful eating score increased; however, as physical activity increased the participants were more likely to be less aware of their dietary intake (Moor et al., 2012). Framson et al. (2009) also found that as mindful eating scores increased body mass index decreased. With the exception of yoga, physical activity was not associated with a higher mindful eating score. Therefore the purpose of this study was to assess

mindful eating characteristics of college students at a Midwestern university with regard to age, gender, physical activity, year in school, and academic major.

Methods

Within the first three weeks of the semester, the Mindful Eating Questionnaire was administered to students enrolled in two lower level nutrition classes. One class, a general education course, meets the requirement for a wellness credit as part of the core curriculum. The second is designed for students with a health science major (nursing, exercise science, dietetics). It is considered a wellness credit; however, it is required for those majors and is a more focused nutrition course. Students reported their personal level of agreement with each statement using a four point Likert scale, with higher scores indicating more mindful eating. All study procedures were explained and participants read and signed an informed consent approved by the University's Institution Review Board prior to completing the survey.

Survey Description: The Mindful Eating Questionnaire, validated by Framson et al. (2009), consists of 28 statements along with demographics and self-reported level of physical activity. The survey is divided into five subscales. Disinhibition (statements 1-8), refers to the inability to stop eating when one is full (Framson et al., 2009). Awareness (statements 9-15), is being cognizant of the food being consumed, the taste, smell, and appearance (Framson et al., 2009). External cues (statements 16-21), triggers outside of the body that stimulate hunger (Framson et al., 2009). Emotional response (statements 22-25), is the tendency for individuals to consume food in response to emotions (Konttinen, Mannisto, Sarlio-Lahteenkorva, Silventoinen, & Haukkala, 2010). Finally, distraction (statements 26-28), is the term used for consuming food while simultaneously participating in non-food related activities (Oldham-Cooper, Hardman, Nicoll, Rogers, & Brunstrom, 2011). Each subscale was analyzed by comparing the average

level of agreement for each statement. The sum of all items was used to determine overall mindfulness. Scores were inverted for 12 statements as done by Moor et al. (2012), with higher scores indicating more mindful eating. Table 1 contains the Mindful Eating Questionnaire with the statements with inverted scoring denoted. Mean scores were calculated for the total survey population as well as the five subscales.

Table 1:
Mindful Eating Survey

Please rate your degree of agreement with these statements.
4= Strongly Agree 3=Moderately Agree 2= Slightly Agree 1= No or Little Agreement

No.	Statement	Score
1 [a]	I stop eating when I am full even when eating something I love.	
2 [a]	When a restaurant portion is too large I stop eating when I am full.	
3[a]	When I eat at 'all you can eat' buffets I tend to overeat.	
4*[a]	If there are leftovers that I like, I take a second portion even though I am full.	
5*[a]	If there is good food at a party, I will continue eating even after I am full.	
6[a]	When I am at a restaurant, I can tell when the portion I have been served is too large for me.	
7*[a]	When I am eating one of my favorite foods, I do not recognize when I am full.	
8*[a]	If it doesn't cost too much more, I get the larger size food or drink regardless of how hungry I feel.	
9[b]	I notice when there are subtle flavors in the food I eat.	
10[b]	Before I eat I take a moment to appreciate the colors and smells of my food.	
11[b]	I appreciate how my food looks on my plate.	
12[b]	When eating a pleasant meal, I notice if it makes me feel relaxed.	
13[b]	I taste every bite of food I eat.	
14[b]	I notice when the food I eat affects my emotional state.	
15[b]	I notice when foods or drinks are too sweet.	
16[c]	I recognize when food advertisements make me want to eat.	
17[c]	I notice when I am eating from a dish of candy just because it is there.	
18[c]	I recognize when I am eating and not hungry.	
19[c]	I notice when just going to a movie theater makes me want to eat candy or popcorn.	
20[c]	When I eat a big meal, I notice if it makes me feel heavy or sluggish.	
21[c]	At a party where there is a lot of food, I notice when it makes me want to eat more food than I should.	
22*[d]	When I am sad I eat to feel better.	
23*[d]	When I am feeling stressed at work I'll go find something to eat.	
24*[d]	I have trouble not eating ice cream, cookies, or chips if they are around the house.	
25*[d]	I snack without noticing that I am eating.	
26*[e]	My thoughts tend to wander while I am eating.	
27*[e]	I think about things I need to do while I am eating.	
28*[e]	I eat so quickly that I don't taste what I am eating.	

*indicates statements that were reverse scored; [a] indicates distraction, [b] awareness, [c] external cues, [d] emotional response, [e] disinhibition subgroups

Study Participants: Within the classes surveyed, 427 of students completed the presented survey. Table 2 describes the student population characteristics. The majority of students were female (60.7%). The ages ranged from 18 to 41, with most of the students between 18 and 20 years old (66.3%). Most were in their sophomore year of school (33.7%). Just over 47% of students stated they are moderately active. The majority of the students were enrolled in the general education nutrition course (65.3%).

Table 2:
Characteristics of Study Population

Demographic	n	%
Sex		
Female	259	60.7
Male	168	39.3
Age		
18-20	283	66.3
21-23	105	24.6
24-26	20	4.7
27-30	9	2.1
31-40	8	1.9
>41	1	.2
Class		
Freshman	103	24.1
Sophomore	144	33.7
Junior	112	26.2
Senior/Graduate	68	15.9
Activity		
Sedentary	18	4.2
Mild	134	31.4
Moderate	201	47.1
Extreme	74	17.3
Academic Major Focus		
General Education	279	65.3
Health Science	148	34.7

Data Analyses: All statistical analyses were performed using SPSS (version 20, 2011, IBM, Chicago, IL). Frequencies were calculated using the descriptive statistics feature in SPSS.

ANOVA was used to compare means of each fixed variable and to determine the effect of the interactions between the fixed variables. Level of significance was set at the ≤0.05 level.

Results

As seen in Table 3, the mean mindful eating scores for participants, the summary score for the entire study population is 2.47. Higher scores represent more mindful eating. Mean subscale scores are as follows: external cues 3.00, awareness 2.62, disinhibition 2.39, distraction 2.06, and emotional response 1.9.

Table 3:
Mean Mindful Eating Scores for Participants

Category N=427	Score
Disinhibition	2.39
Awareness	2.62
External Cues	3.00
Emotional Response	1.90
Distraction	2.06
Summary Score	2.47

The mean mindful eating scores comparing gender (Table 4) show that females are more mindful than their male counterparts in three areas. Those areas are awareness 0.027, external cues <0.001, and emotional response <0.001. Female summary score was significantly higher.

Table 4:
Comparison of Mindful Eating Scores by Gender

Category	Female n=259	Male n=168	p-value*
Disinhibition	2.37	2.42	NS
Awareness	2.67	2.54	0.027
External Cues	3.08	2.88	<0.001
Emotional Response	2.02	1.72	<0.001
Distraction	2.11	1.99	NS
Summary Score	2.52	2.40	<0.001

*NS indicates no significance at the .05 level

Table 5, comparison of mindful eating scores by age, shows that students over the age of 24 years old had the highest summary score (2.50). They also had the highest scores in

disinhibition (2.40), awareness (2.71), and external cues (3.04). Participants between 18 and 20 years old had the highest emotional response (1.95) and distraction (2.07) scores. However, none of these differences were statistically significant.

Table 5:
Comparison of Mindful Eating Scores by Age

Category	18-20 n=283	21-23 n=105	24-<41 n=28	p-value*
Disinhibition	2.39	2.38	2.40	NS
Awareness	2.61	2.64	2.71	NS
External Cues	3.00	3.00	3.04	NS
Emotional Response	1.95	1.78	1.85	NS
Distraction	2.07	2.02	1.94	NS
Summary Score	2.48	2.45	2.50	NS

*NS indicates no significance at the .05 level

As seen in Table 6, juniors had the highest summary score (2.52) and emotional response score (1.92). Seniors/graduate students had the highest disinhibition score (2.43). Freshman and juniors had the same score (2.64) for awareness and external cues (2.91), and finally freshman had the highest distraction score (2.14). Again, none of these differences were statistically significant.

Table 6:
Comparison of Mindful Eating Scores by Year in School

Category	Freshman n=103	Sophomore n=144	Junior n=112	Senior n=68	p-value*
Disinhibition	2.33	2.39	2.42	2.43	NS
Awareness	2.64	2.59	2.64	2.63	NS
External Cues	3.01	2.93	3.10	2.97	NS
Emotional Response	1.91	1.91	1.92	1.85	NS
Distraction	2.14	2.00	2.11	2.01	NS
Summary Score	2.46	2.44	2.52	2.47	NS

*NS indicates no significance at the .05 level

As seen in Table 7, the students who were sedentary to mildly active had the highest scores. Sedentary students had a higher total summary score (2.51), emotional response (2.44), disinhibition (2.43), and distraction (2.22). Mildly active students scored higher in awareness

(2.65) and external cues (3.02). The only significant difference that was observed was for emotional response, meaning sedentary individuals were less likely to eat in response to emotions (p=0.004).

Table 7:
Comparison of Mean Scores by Physical Activity Level

Category	Sedentary n=18	Mild n=134	Moderate n=201	Extreme n=74	p-value*
Disinhibition	2.43	2.38	2.38	2.42	NS
Awareness	2.61	2.65	2.60	2.63	NS
External Cues	3.01	3.02	3.00	2.96	NS
Emotional Response	2.44[a,b]	2.01[a,c]	1.91[b]	1.66[a,c]	0.004
Distraction	2.22	2.06	2.08	1.97	NS
Summary Score	2.51	2.50	2.47	2.43	NS

*NS indicates no significance at the .05 level; [a] indicates responses are significantly different [b] indicates responses are significantly different; [c] indicates responses are significantly different

The last analysis comparesthe general education class with the health science major class. Table 8shows that those in the general education had higher scores in the awareness (2.64), emotional response (1.91), and distraction (2.07) subscales. Those in the health science majors' class scored higher overall (2.47), and in the disinhibition (2.39) and the external cues (3.09) subscales. The difference observed in regard to external cues was the only significant difference, meaning that students with a health science major are less likely to eat in response to external cues (p=0.019).

Table 8:
Comparison of Mean Scores by Focus of Academic Major

Category	Gen. Educationn=279	Health Sciencen=148	p-value*
Disinhibition	2.38	2.39	NS
Awareness	2.64	2.56	NS
External Cues	2.94	3.09	.019
Emotional Response	1.91	1.88	NS
Distraction	2.07	2.03	NS
Summary Score	2.44	2.47	NS

*NS indicates no significance at the .05 level

ANOVA tests revealed that the only significant interaction between summary score and the fixed variables was with gender (p= <0.001). No other interactions were found between summary score and any of the other fixed variables (age, physical activity level, year in school, and focus of academic major). However, there was a significant two-way effect of gender and physical activity level (p=0.034) on total summary score, indicating as physical activityincreased in females mindful eating did as well. A significant three-way effect of age, year of school, and physical activity level (p=0.049) on total summary score; showing that as age, year of school, and physical activity level increased so did summary score. No significant effects were observed with the disinhibition subscale. The only significant interaction within the awareness subscale was a three-way effect with age, year of school, and physical activity level (p=0.007), as age, year of school, and physical activity level increased so did the awareness score. A three-way effect was observed between emotional response and gender, year of school, and academic major focus (p=0.035), as females enrolled in the health science nutrition course, and as year of school increased so did the emotional response score. Finally, a two-way effect was found between distraction and gender and physical activity (p=0.018), indicating that physically active females were less likely to eat distracted. A three-way effect with year of school, physical activity, and academic major focus (p=0.031), meaning that those enrolled in the health science nutrition course, and as year of school and physical activity level increased participants were less likely to eat while distracted.

Discussion

Using a 28 item validated Mindful Eating Questionnaire (Framson et al., 2009) this cross-sectional study assessed mindful eating characteristics of undergraduate students enrolled in nutrition classes at a Midwestern university.The researcher hypothesized that male students

would be less mindful than females, individuals who are mildly to moderately active would be more mindful, as age and year of school increased so does mindfulness, and finally that students enrolled in the health science focused nutrition class would be more mindful.

The results of this study show that females reported more mindful eating practices than males, in all areas except disinhibition. This is similar to the findings by Framson et al. (2009) who found that compared to men, women had higher mean scoresas well as all the subcategories except emotional response. These findings support the hypothesis that college aged women are more mindful then college aged men. LaCaille et al., (2011) found that male college students desired to gain weight, primarily lean body mass, whereas female students were fearful of gaining weight. Those two factors could explain why women were found to be more mindful eaters in the present study.

Next, no significant differences were found between the age groups. This is in contrast to findings by Framson et al. (2009), who found that as age increased so did mindful eating score. The differences in these findings could be due to the fact that the ages between the study populations vary greatly. The majority of participants in the Framson et al. (2009) study were over the age of 30, whereas in the current study, most students were under 23 years of age. There were also no significant differences found between what year in school the participants were in. These findings coincide with the findings of Driskell et al. (2005). Driskell et al. (2005) found very few differences between eating habits of lower-level and upper-level college students. No significant differences were seen in these two categories which is contrary to the hypothesis, that as age and year in school increase, mindful eating would also increase. There are three possible explanations for this. First,a disproportionate number of study participants were in the lower age groups and their freshman and sophomore years of school. Second, starting at a

certain age, most likely post college, eating mindfully may become more of a priority. Since most of this study's participants were under 23 years of age, they, had not yet reached that point in their lives. Third, since obesity has been a public issuefor most of the participant's entire lives they, therefore, are already mindful about eating.

The only significant difference in regard to physical activity was a negative relationship with emotional response. While extremely active participants had the lowest score, sedentary had the highest, which refutes the fourth part of the hypothesis, that mildly and moderately active participants are the most mindful. In line with these findings, Framson et al. (2009) found no strong associations between mindful eating scores and physical activity, with the exception of yoga. Moor et al. (2012) also found no significant relationships between physical activity and mindful eating scores, except for a negative relationship with physical activity and awareness and emotional response. Grinnell et al., (2011) also found no significant relationship between physical activity and mindful eating scores. It is possible that as exercise increases mindful eating decreases, due to the reasoning that anything can be consumed since it will be work offed later.

When comparing differences between the general education and the health science focused courses, there were no significant differences found except for the subcategory of external cues. This difference showed that those in a health science focused class had higher scores in the external cues subscale. This means that those in the class with a health science focus reported being able to be aware that overeating could easily occur in the presence of food. These findings were not expected, since it was hypothesized that participants enrolled in the general education course would be less mindful. A possible explanation could be the general education course was also a nutrition course.

Some interactions were found between the factors and mean score as well as subcategory scores. The mean score was impacted by the interaction of gender and physical activity level.The combination of age, year in school, and physical activity level also influenced the mean score. Scores for the awareness subcategory were also impacted by the combination of age, year in school, and physical activity level. Emotional response scores were influenced by the combined effect of gender, year in school, and focus of academic major. Distraction scores were influenced by the combination of gender and physical activity level, as well as the combination of year in school, physical activity level, and focus of academic major. The fact that a combination of factors could impact survey scores indicates that mindful eating is influenced by more than one factor, that a multitude of things impact eating attitudes.

This study does face two limitations, the first being that the survey was given in two nutrition classes. This was thought to be counteracted by the fact that the classes that were surveyed are lower level classes and therefore may represent more of a variety of fields of study when compared to upper level classes. The general education class is a required course that fulfills the necessary requirement for wellness credits, and the health science course is required for those degrees. However, upon examining the results, it appears that having all participants enrolled in nutrition classes could have skewed the results more than expected. Even though the general education nutrition class encompassed a variety of majors, the interest in eating mindfully was equally present overall. The possibility exists that the general education students are more interested in nutrition and thus more mindful eaters. The second threat to this study is that the survey is asking about perceptions concerning eating behaviors which can be hard to measure. This is being somewhat offset by allowing the participants to rank their agreement level with the statements as opposed to simply stating yes or no.

Conclusions

This study found that female undergraduate students were more mindful eaters than their male counterparts. Age and year of school had very little effect on mindful eating. The amount of physical activity had no significant effect on mindful eating scores. Finally, whether students were in a general education or a health science focus nutrition course made no difference in total mindful eating scores. Since there were few significant differences in this study sample and it is one of the only studies involving more than 100 participants, it is suggested that this survey be given to a large sample in a more diverse student population in order to examine the mindfulness of undergraduate college students.

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CHAPTER 4. SUMMARY AND CONCLUSIONS

This cross-sectional study consisted of 427 undergraduate students enrolled in one of two lower level nutrition courses. The first course was a general education course and the second was a course designed for health science majors (dietetics, exercise science, and nursing). A validated survey was given during the first three weeks of the semester. Data was collected over seven semesters.

The survey used was validated by Framson et al., (2009), and consisted of 28 statements along with demographics and self-reported physical activity level. Level of agreement with each statement was recorded using a four point Likert scale. The survey statements were divided into five subscales: disinhibition, awareness, external cues, emotional response, and distraction. Disinhibition refers to the inability to stop eating when full. Awareness is defined as appreciating the effect food has on the senses, how food smells, looks, and tastes. External cues refer to eating in response to external stimuli, the smell or site of food, commercials or someone talking about food. Emotional response to food is the tendency for individuals to eat in response to negative emotions. Finally, distraction refers to when an individual eats while engaging in non-food activities (Oldham-Cooper et al., 2011).

The purpose of this study was to assess mindful eating characteristics of college students with regard to age, gender, physical activity level, year of school, and academic major. It was hypothesized that female students would be more mindful than male students. As age and year in school increased so would mindful eating. That students who were mildly to moderately active would be more mindful than their sedentary and extremely active counterparts. Finally, those in a health science degree focused nutrition class would have higher mindful eating scores than those enrolled in a general education nutrition course.

This study found that female students had significantly higher overall mindful eating scores than male students. This was also the case for awareness, external cues, and emotional response. This is in line with the hypothesis that females are more mindful than males. It is commonly believed that overall women are more concerned with their body weight which in turn makes them more likely to be conscious of eating.

Age had no significant effect on total mindfulness or any of the subscales. This is in contrast to the hypothesis that as age increased so would mindfulness. It was expected that as age increased so did mindfulness. This is also in contrast to findings by Framson et al. (2009) who found that as age increased so did mindful eating scores. The observed differences could be due to the fact that this study population was much younger than that used by Framson et al. (2009). The majority of students, in the current study, were under the age of 23 making the other age groups small in number.

Contrary to the hypothesis, no significant differences found between year in school. Just as it was expected that mindfulness increases with age, it was also expected that as year of school increased so would mindful eating scores. This might be due to the fact that the survey was given in nutrition class and in turn the students are more mindful than those not enrolled in a nutrition class.

Surprisingly, the only significant difference with regard to physical activity is in the emotional response subscale, in which sedentary individuals had the highest score. It was hypothesized that participants who are mildly to moderately active would be more mindful eaters than their sedentary and extremely active counterparts. Again, these results could be related to the fact that the surveys were given in nutrition classes.

Again, there were no significant differences seen between the general education and health science major focus classes, with the exception of the external cues subscale. This is also in contrast to the hypothesis, it was expected that those students in the course designed for health science majors would have higher scores than those in the general education course. The lack of differences could be related to the fact that again, this study was conducted in two nutrition courses.

When combined some of the factors did affect the total score as well as subscale scores. Total mindful eating score was influenced by the combination of gender and physical activity and age, year in school, and physical activity. No effect was seen on disinhibition. Awareness was influenced by age, year in school, and physical activity. Emotional response was impacted by gender, year in school, and focus of class. Finally, gender and physical activity and year in school, physical activity level, and focus of class influenced the distraction subscale.

Possible reasons for the differences in results compared to what was hypothesized could be related to the large number of students in the two youngest age groups. This could have been counteracted by dividing the age groupings further, by year rather than two years. It was thought that although the survey was given in two nutrition classes, which by giving the survey in two lower level classes the influence of the course would be negated. However, it appears that students enrolled in a nutrition class may be more conscious of their eating behaviors. Also, since all data was self-reported while in class, students may have reported answers that they perceived to be correct. It was expected that since the survey was anonymous that students would be honest.

In conclusion, this study found that gender plays a role in perceived mindfulness of college undergraduate students. It was also found that age, year in school, physical activity level, and focus of academic major made little to no difference on overall mindful eating score, but did influence some of the survey subscales. Combinations of factors were seen to influence overall mindful eating score as well as several of the subscales. More research is needed to further evaluate mindful eating among college students.

Currently this is one of the largest studies involving mindful eating in a college population. Most studies consisted of 100 or less participants. It is suggested that further research involves a large population in order to be able to apply the findings to the greater population. It is also recommended for research in a more diverse population, particularly not students enrolled in nutrition courses, in order to more accurately determine mindfulness of college undergraduate students. The addition of reporting height and weight is also suggested so that body mass index can be calculated, in order to determine if mindful eating education could benefit overweight and obese individuals. Determining this would show whether mindful eating education could slow, or even reverse, the obesity epidemic currently affecting the college student population.

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APPENDIX A. IRB EXEMPTION

NDSU NORTH DAKOTA STATE UNIVERSITY

Institutional Review Board
Office of the Vice President for Research, Creative Activities and Technology Transfer
NDSU Dept. 4000
1735 NDSU Research Park Drive
Research 1, P.O. Box 6050
Fargo, ND 58108-6050

701.231.8995
Fax 701.231.8098

Federalwide Assurance #FWA00002439
Expires April 24, 2011

February 2, 2010

Dr. Ardith Brunt
Dept. of Health, Nutrition & Exercise Science
EML 351F

Re: IRB Certification of Human Research Project:

"Do Nutrition Students Practice Mindful Eating"
Protocol **#HE10168**

Co-investigator(s) and research team: **n/a**

Study site(s): **NDSU** Funding: **n/a**

It has been determined that this human subjects research project qualifies for exempt status (category # 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*). This determination is based on the protocol form received 1/27/2010 and consent/information sheet received 2/2/2010.

Please also note the following:

- This determination of exemption expires 3 years from this date. If you wish to continue the research after 2/1/2013, submit a new protocol several weeks prior to this date.
- The project must be conducted as described in the approved protocol. If you wish to make changes, pre-approval is to be obtained from the IRB, unless the changes are necessary to eliminate an apparent immediate hazard to subjects. A *Protocol Amendment Request Form* is available on the IRB website.
- Prompt, written notification must be made to the IRB of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Any significant new findings that may affect the risks and benefits to participation will be reported in writing to the participants and the IRB.
- Research records may be subject to a random or directed audit at any time to verify compliance with IRB policies.

Thank you for complying with NDSU IRB procedures; best wishes for success with your project.

Sincerely,
Kristy Shirley
Kristy Shirley, CIP
Research Compliance Administrator

APPENDIX B. INFORMED CONSENT

Title of Research Study: Do Students Practice Mindful Eating?

Dear Student:

My name is Ardith Brunt. I am a faculty member in Health Nutrition & Exercise Sciences at North Dakota State University, and I am conducting a research project to determine how aware students are of their eating habits. It is our hope, that with this research, we will learn more about mindful eating.

Because you are in the general education nutrition class, you are invited to take part in this research project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known risks. For this study, psychological distress may be a risk.

You may not get any benefit from being in this study. Benefits to others are likely to include more knowledge about mindful eating and what contributes to being aware of eating patterns. Also I hope to determine if changes in mindful eating occur during a nutrition wellness class.

It should take about 5-7minutes to complete the questions about your eating practices.
Please select a 4 digit code that you will remember and enter those digits into the box in the right hand corner. (It is suggested that you write these down, so you will not forget your code.) Complete the survey. Then turn in the survey and sign the sign in sheet so that you will receive the 4 bonus points for completing the survey. These points (8 points total—4 for this survey and 4 at the end of the semester) will be part of the 20 total participation/bonus points allowed in the class. At least 20 other bonus point opportunities will be available in this class for those who do not wish to participate in this project.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

If you have any questions about this project, please call me at 231-7475.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8908, ndsu.irb@ndsu.edu, or by mail at: NDSU HRPP Office, NDSU Dept 4000, PO Box 6050, Fargo, ND 58108-6050.

Thank you for your taking part in this research. If you wish to receive a copy of the results, please include your email address on the informed consent.

APPENDIX C. STUDENT BASELINE SURVEY

Mindful Eating Questionnaire

Please rate your degree of agreement with these statements.

4= strongly agree 3= Moderately Agree 2= Slightly agree 1= no or little agreement

No.	Statement	Score	
1	I stop eating when I am full even when eating something I love.		
2	When a restaurant portion is too large I stop eating when I am full.		
3	When I eat at 'all you can eat' buffets I tend to overeat.		
4	If there are leftovers that I like, I take a second portion even though I am full.		
5	If there is good food at a party, I will continue eating even after I am full.		
6	When I am at a restaurant, I can tell when the portion I have been served is too large for me.		
7	When I am eating one of my favorite foods, I do not recognize when I am full.		
8	If it doesn't cost too much more, I get the larger size food or drink regardless of how hungry I feel.		
9	I notice when there are subtle flavors in the food I eat.		
10	Before I eat I take a moment to appreciate the colors and smells of my food.		
11	I appreciate how my food looks on my plate.		
12	When eating a pleasant meal, I notice if it makes me feel relaxed.		
13	I taste every bite of food I eat.		
14	I notice when the food I eat affects my emotional state.		
15	I notice when foods or drinks are too sweet.		
16	I recognize when food advertisements make me want to eat.		
17	I notice when I am eating from a dish of candy just because it is there.		
18	I recognize when I am eating and not hungry.		
19	I notice when just going to a movie theater makes me want to eat candy or popcorn.		
20	When I eat a big meal, I notice if it makes me feel heavy or sluggish.		
21	At a party where there is a lot of food, I notice when it makes me want to eat more food than I should.		
22	When I am sad I eat to feel better.		
23	When I am feeling stressed at work I'll go find something to eat.		
24	I have trouble not eating ice cream, cookies or chips if they are around the house.		
25	I snack without noticing that I am eating.		
26	My thoughts tend to wander while I am eating.		
27	I think about things I need to do while I am eating		
28	I eat so quickly that I don't taste what I am eating		

Please fill in the NUMBERS of the groups you fit into.

_____ Female=1 or Male=2

_____ Age 1= 18-20 2= 21-23 3= 24-26 4= 27-30 5= 31-40 6= 41 and above

_____ Freshman=1 Sophomore=2 Junior=3 Senior = 4 Graduate=5

____ Physical activity: 1= sedentary 2= mildly active 3= moderately active 4= extremely active\

List your favorite exercise or activities

Excerpted from Framson, C Kristal, AR, Schenk, JM, Littman, AJ, Zeliat, S, Benite,D. Development and validation of the mindful eating questionnaire..J Am Diet Assoc. 2009;109:1439-1444.